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TRANS-WESTERN'S ARCTIC ISLANDS PROJECT

MARKET PROSPECTS FOR PRODUCTION

For the purpose of this memo, it is assumed that prolific production of oil as predicted by geologists, will be found in the Arctic Islands Sedimentary Basin.

REASONS FOR ARCTIC ACTIVITY:

"Prospects for submarine tanker transportation of crude oil .... which would place the Islands within 3000 miles of Europe. . . . is one of the principle factors behind the stampede north. Research on oil tankers is being carried out in three countries at least, with English experiments advanced to test models of an 80,000 ton capacity tanker with a speed of up to 50 knots. A prolific number of giant structures which hold prospects of Middle East size oil or gas accumulation is another factor in drawing oil companies northward." (Myers Oilweek, Feb. 27/59, p. 3. The Publisher, Mr. Myers, is a Professional Engineer.)

PROLIFIC PRODUCTION:

For the reasons set out in the submitted geology "Some Geological Notes", prolific production is anticipated analogous to that of the Salt Dome production of the Gulf of Mexico; to the prolific production of the ancient enclosed sea area of the Caribbean oil fields; and similar to the prolific production of the Middle East which has similar characteristics to the Arctic Islands Sedimentary Basin. Production from huge wells of course yields oil at greatly reduced cost, and permits that oil to compete successfully.

GROWING WORLD MARKET FOR OIL & GAS:

Probably it will be universally conceded that the world faces a long term shortage of oil and natural gas. Not only is consumption increasing every year in the North American countries, but the rate of increase is greater elsewhere. In Europe and in Japan the rate of increase of consumption is greater than in North America and without any matching increase in discovery and production in those areas. In the underdeveloped countries, such as those in Africa and Asia, substantial demand for oil and gas for energy and heat is only commencing, and there is every evidence that the rate of increase in demand will be tremendously accelerated.

UNITED STATES AND NORTH AMERICAN RESERVES:

Cost of U.S.A. discovery is rising, and fruits of exploration are declining. That decline in reserves will be accelerated under the quota import system now in effect. (Economic Notes, page 9.) "About 100 billion barrels of additional oil reserves will have to be found during the next 20 years to meet North America's growing oil demand. That's three times the present reserves. To meet this demand, large new areas of reserves will be needed. This, coupled with the fact that U. S. reserves are becoming increasingly difficult to find, is one of the principle forces behind the booming exploration in Canada's far North." (Oilweek, April 3/59, page 3).

"Dwindling U. S. Reserves. The trend is forecast by the greater amount of drilling required in finding dwindling new oil supplies in the United States, which, with less than 1/6th of the free world's oil reserve, supplies half the production.

"During 1957 for the first time in 13 years, the U. S. turned up less new oil reserves than it produced. Reserves of oil and liquid hydrocarbons stood at 36 billion barrels at the start of 1958, a net drop of nearly 350 million barrels during the year. Drilling efforts during the past decade have been increasingly less rewarding year by year. New reserves developed per foot of hole drilled declined from 28 barrels per foot for 1957. In 1948 to 11 barrels. Per well drilled, the reserves dropped from 101,346 barrels to 46,283 barrels during the same period.

"The U. S. and Canada, with combined reserves of some 33 billion barrels, are presently consuming crude oil at an annual rate of some 3 billion barrels. Based

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on a projected annual increase of 5%, consumption will probably double during the next 20 years to a rate of some6 billion barrels per year.....Altogether this means that new reserves of close to 100 billion barrels will have to be developed and dedicated to North America's oil reserves.

"Continental U. S. reserves, becoming more expensive and more difficult to find each year, will supply only a small portion of these additional required reserves. The Middle East and Venezuela will supply a significant proportion. But these reserves will also be required to meet the needs of Europe and other free world areas, where petroleum consumption is expected to grow at a much faster rate than in North America..." (Oilweek, April 3/59, P. 21)

MARKETS FOR ARCTIC PRODUCTION:

"Based on this reasoning, it is inevitable that far northern portions of North America will be called upon in large measure to meet the vast amount of new reserves that will be required for the North American oil demand." (Oilweek, Apr. 3/59, Page 4.)

"Ironically, the most northerly of these areas - the Arctic Islands - may be the areas closest and most accessible to major market outlets through the future development of submarine tanker transportation.....these islands are within 3000 sub-sea tanker-miles of Europe - less than half the distance from the Persian Gulf to England. Thus these Arctic Islands could constitute a major future source of Europe's oil supply. Oil companies have already filed on some 80 million acres here." (Oilweek April 3/59, page 21)

"And reserves in Alberta are even now feeling the disadvantage of their land-locked position and great distances to market - a serious obstacle in their competition with tanker-borne foreign crude." (Oilweek, April 3/59, p. 24)

NORTH AMERICAN AND EUROPEAN MARKETS:

Mr. Myers, in Oilweek, Feb.27/59, editorially writes on page 40 "...sitting on top of the world, the Arctic Islands oil could flow 3000 miles on the one side into Central United States and Canada, and 3000 miles on the other side into the vitals of Europe."

The distance from Melville Island to Southampton via the North Pole is 3300 miles; Persian Gulf to U. K. is 8000 miles. This gives Arctic crude a great advantage in European markets. A submarine tanker getting the same tariff per 100 miles would have a cushion of 39.6¢ per barrel in carrying Arctic oil to U.K., as against Persian Gulf oil. "It (the Arctic Basin) is less than half the distance from Venezuela to Europe." (Oilweek, Feb. 27/59, page 16)

COMPARATIVE OIL SHIPMENT COSTS:

Surface tanker costs are lower than pipelining costs, and submarine tanker costs will be lower than surface tanker costs. (See Economic Notes, p.4.) The ratio is 4/5ths of a cent per barrel per 100 statutory miles by surface tanker, against 3 cents by pipeline. (Economic Notes, p. 4.)

JAPANESE MARKET:

To date sales to Japan of crude oil out of Vancouver, B C. have been small. The future is believed to hold great potential. The following statistics are from World Oil, Aug.15/58, p.290, and from World Petroleum "Report" Feb.1959, P. 20:-

"Proved crude oil reserves in Japan as of January 1, 1958 amounted to 21,500,000 barrels oil, and 7,060,000 MMcf gas." "Japan produced 2,583,000 bbls in 1958. Consumption in 1958 - 121,910,000 bbls",& est. 1959 - 137,605,000 bbls. Thus Japan has to import most of her oil. Her own reserves will last less than 8 years, while demand in 1959 is expected to increase by approximately 13% over 1958. This compares with an approximate increase of 4.3% in the United States in the year 1959.

Middle East oil is 7920 statutory tanker-miles from Japan, whereas Arctic oil would be only 3630 miles distant - less than half the distance. The decreasing total production of the Far East, including Indonesia, is only 430,000 barrels a day, much less than in Canada, and is not a great factor.

MARKETING PRODUCTION (Transport)

The economics of marketing production of the Arctic Islands steadily improve with advances now taking a practical form in sub-ice transport; tanker borne L.P.G.'s; advances in respect to the maintaining of ice-free harbours; and in the maintaining of suitable surface channels with ice-breakers. (Economic Notes p. 2) Economics favour the submarine tanker as being cheaper to build and because it cruises so much faster than surface tankers, cheaper to operate.

ADVANTAGE OF COASTAL OIL:

Land-locked oil which requires pipelining, suffers a market disadvantage. Operators make every effort to develop and acquire sources of oil with easy access to sea routes. Lower costs of shipping coastal oils admits them to the markets of the world. Arctic Oil, and L.P.G.'s will have a political advantage in the North American market; sea borne advantage against North American pipelined oil; and because of access to the oceans, and shorter trade routes, will be able to out-sell Middle East oil in the great European market.

SURFACE SEA TRANSPORT: (Economic Notes, p. 2)

"Accessible by ship. Nearly all the Islands of the Archipelego are accessible by ship during the summer period of two to five months. Some years navigation is open all winter through Barrow Strait and Lancaster Sound to a few of the larger islands." (Myers Oilweek, Feb. 26/59 p. 14). Russia is reported to be maintaining open water channels with atomic ice-breakers in the Arctic Ocean.

ICE-FREE HARBOURS:

"Polynia" harbours as necessary will be kept free of ice by the now well established system of gridding the harbour bottoms with perforated compressed air piping, used to agitate the water adequately to keep it from freezing.

"ALL YEAR USE OF SEAWAY (St. Lawrence) SOUGHT:

..... bill introduced by Sen. Wiley of Wisconsin would authorize the Corps (U.S. Corps of Engineers).....to review the applicability of the de-icing methods developed by private concerns or governments to the Seaway and Great Lakes Region.....relative to the establishment of a de-icing system;.... study of the conditions and problems between areas now successfully utilizing de-icing methods. The fact that de-icing systems are used in harbours normally ice-bound throughout the winter in Canada and elsewhere is sufficient evidence that efforts to combat winter ice in the Great Lakes hold promise for the future." "Senator Wiley added, the method of de-icing systems that have been developed include the bubble system, an under-water piping system in which compressed air moves through tiny holes to the surface, melting the ice.... and other methods." Calgary Herald, July 16, 1959.

ADVANTAGE TO TANKERS:

"Another threat seen by Mr. Lee (Western Decalta Petroleums) is the St.Lawrence Seaway. He says it would now be possible for ocean going tankers to bring...oil...as far as Toronto, or even the Lake Head. This could be done at prices which couldn't be matched by western producers using the Interprovincial Pipeline." (Ron Kennedy, Calg.Her.Apr.24/59) (Economic Notes, p. 8). Thus oil from the Arctic could compete in the North American interior with foreign-borne crude and against domestic pipelined oil. With North American tariff and quotas of course the Arctic oil would have additional advantage. (Ec.Notes p.9)

ATOMIC SUBMARINE TANKERS: (See Economic Notes, p. 2)

These Arctic Islands border on the Great Northwest Passage now established by cruises of nuclear submarines beneath the Polar ice cap, protected by that ice from storm, fog and icebergs. The Northwest Passage could quickly become one of the world's greatest trade routes linking the Pacific and Atlantic Oceans by shortened routes. "The Maritime

administration (U.S. Federal Administration) believes that 40 knot submarine tankers are a possibility. To attain that speed the Sub would require far less power than would /surface counterpart". The foregoing is quoted from "The Arctic as a Sea Route of the future" by Commander William R. Anderson, U.S.N., Capt. U.S.S. Nautilus, p.21, Jan.'59 Geographic Magazine. Myers, writing on the 20th of February, 1959, on submarine tankers, stated "Engineers already know that when it becomes developed, submarine tanker transportation will be cheaper than surface tanker transportation of crude. A submarine tanker will require only 40% of the horsepower required for comparable size of surface tanker."

PIPELINES: These are feasible and practical. See Economic Notes, p. 3.

COSTS OF PRODUCTION:

It is now generally conceded that as development progresses, depots will be established at first at island harbours where there is already ice-free access during the short summers, up to 5 months, and where the shipping season can be extended by ice-breakers. Overland hauling is facilitated by the very low precipitation on these islands; absence of muskeg; and the freedom from permanent ice-caps and glacial ice; also by the flat topography. (Ec.Notes, p.4) It is indicated that the Dominion Government will enact such attractive oil and gas regulations as may be necessary to assure development. Material help is being given in regard to organizing shipping and aviation, and making available facilities of the numerous government stations.

In this early stage, cost can be saved by getting in supplies in advance by surface shipping. The probability is that costs will be less in these Arctic Islands than in the land-locked areas of the Northern interior of the Continent.

"And in the far north of the Northwest Territories and the Arctic Islands, oil finding costs - once the problem of distance and transportation have been solved - may be even lower than on the Southern Plains." (Oilweek, Apr. 3/59, p. 21)

OPERATIONS PRACTICAL:

Full oil drilling and development operations have been carried out in the Arctic at Point Barrow, north of the Arctic Circle, and at Norman Wells just south of the Arctic Circle, where Imperial produces oil and operates a refinery. At these points the absolute minimum temperature is lower than in the Arctic Islands, where other conditions are better.

OFF-SHORE SHIPMENT OF NATURAL GAS:

This has been established as economical by the tanker "Methane Pioneer". Carl O. Nickle, former Member of the Canadian Parliament and Publisher of the Daily Oil Bulletin, quotes Vice-Chairman, William R Connole of the U.S. Federal Power Commission on tankering liquified natural gas, as follows:- "Every cost estimate I have seen concludes that natural gas from abroad can compete with pipeline gas in the densely populated Coastal United States." Thus gas in the Canadian Arctic Islands could be exported commercially. (Economic Notes, p. 9)

POLITICAL ADVANTAGES:

This subject is dealt with in Trans-Western's "Economic Notes", page 9. Since those notes were compiled, we have seen Chile confirm the exclusion of private industry from the oil and gas scene of that country. The Western countries are losing their control over the major oil producing areas outside of the U.S.A. and Canada.

The permanently disturbed politics of most of the prolific producing areas indicate that those supplies will be interrupted from time to time, and thus it is essential to provide adequate markets for North American production so that a stable supply thereof will be assured.

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